



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<b>(21) International Application Number:</b> PCT/AU88/00064  <b>(22) International Filing Date:</b> 10 March 1988 (10.03.88)  <b>(31) Priority Application Number:</b> PI 0752  <b>(32) Priority Date:</b> 10 March 1987 (10.03.87)  <b>(33) Priority Country:</b> AU  <b>(71) Applicant (for all designated States except US):</b> M.J. QUINLAN & ASSOCIATES PTY. LIMITED [AU/AU]; 44 Ellesmere Road, Gympsea Bay, NSW 2227 (AU).  <b>(72) Inventor; and</b> <b>(75) Inventor/Applicant (for US only) :</b> QUINLAN, Michael, John [AU/AU]; 44 Ellesmere Road, Gympsea Bay, NSW 2227 (AU).  <b>(74) Agent:</b> TAYLOR, Paul, Robert; Arthur S. Cave & Co., 10 Barrack Street, Sydney, NSW 2000 (AU).		<b>(81) Designated States:</b> AT (European patent), AU, BE (European patent), CH (European patent), DE (European patent), DK, FR (European patent), GB (European patent), IT (European patent), JP, KR, LU (European patent), NL (European patent), NO, SE (European patent), US.  <b>Published</b> <i>With international search report.</i>
<b>(54) Title:</b> METHOD OF PRODUCING A LAMINAR HOLLOW SNACK FOOD  <b>(57) Abstract</b>  <p>A method of producing a hollow food article comprising contiguously positioning at least two layers of starch-containing material to form a layered material wherein each of said layers has a limited affinity for the adjacent layer(s), shaping said layered material to form an uncooked food article, causing sealing of the interface between the adjacent layers at the extremities of the food article and cooking said food article in a manner such that steam generated within the food article during cooking forces adjacent layers apart at a point remote from the extremities of the food article while retaining contact between adjacent layers at the extremities of the food article.</p>		

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## METHOD OF PRODUCING A LAMINAR HOLLOW SNACK FOOD

The present invention relates to a new method of food manufacture and to foods produced by this new method.

It is known to produce fabricated potato crisps, corn chips and other snack foods by mixing potato and/or cereal granules, flakes or starches with water and other customary additives, shaping the resultant material by rolling or extrusion, and cutting the material to the desired size. The shaped material is then cooked by frying or another suitable process to yield the snack food.

It is an aim of the present invention to provide a method of producing a hollow snack food, article thus reducing the amount of raw materials required for the production of a given volume of snack food and also to provide a method of producing new and novelty shaped snack food articles, thus facilitating the opportunity for increased consumer sales.

The present invention, in one broad form, provides a method of producing a hollow food article comprising contiguously positioning at least two layers of starch-containing material to form a layered material, wherein each of said layers has a limited affinity for the adjacent layer(s), shaping said layered material to form an uncooked food article, causing sealing of the interface between adjacent layers at the extremities of the food article and cooking said food article in a manner such that steam generated within the food article during cooking forces adjacent layers apart at a point remote from the extremities of the food article while retaining contact between adjacent layers at the extremities of the food article.

By selecting a suitable mixture of ingredients, such as a mixture of starch-containing vegetable or cereal granules, and/or flakes together with suitable emulsifiers and other additives customary in food processing and extruding or rolling the mixture under sufficient pressure, it is possible to produce a sheet of material that exhibits a reduced affinity for sheets of the same material and will not stick to the other sheet when two or more layers are subsequently contiguously positioned to form a layered sheet of material. Preferably, the starch-containing material comprises a mixture of potato and/or suitable cereal granules, flakes or starches. The material may also contain suitable emulsifiers or modifying agents.

In one embodiment, the method of the invention provides rolling or extruding a material comprising starch containing vegetable or cereal solids to form at least one layer of said material, contiguously positioning at least two layers to form a layered material wherein each of said layers is separable from the adjacent layer(s), cutting said layered material to form an uncooked food article and cooking the food article in a manner such that steam generated within the food article during cooking forces adjacent layers apart at a point remote from the extremities of the food article while retaining contact between adjacent layers at the extremities of the food article.

In another embodiment, the starch-containing material may be extruded to form a tube which is then passed through at least one set of rollers to form layered material and which may be cut into the desired shape and cooked.

In another embodiment the layered material may then be cut

to shape and the uncooked food articles passed through a drier to yield a stable pellet suitable for storage and transport prior to being cooked and packaged.

Example 1.

Previously processed and dried potato solids with a moisture content of approximately 15-20% were rehydrated by adding water in the range of 30 to 50 weight-% relative to the total of potato solids plus added water. The mixture was then passed through a series of rollers to produce a sheet of material with a thickness of from about 0.1 to 1.0 mm. The sheet was then layered onto itself and the resultant layered material lightly rolled before being cut to the desired shape and fried in cooking oil at approximately 160 to 200°C for 10 to 300 seconds depending on the texture and other properties required. The steam generated during cooking forced the layers apart to form a hollow food article.

It is believed than the method as exemplified in Example 1 works due to retrogradation of the starch. Naturally occurring starch consists mainly of two basic polymers known as amylose and amylopectin. Amylose is a relatively large linear polymer of anhydroglucose units linked through 1,4 -glucidic bonds with each monomeric unit containing primary and secondary hydroxyl groups except the end units of the chain.

The hydroxyl groups impart hydrophilic properties. However, because the molecules of amylose are linear they may become oriented parallel to one another and significant hydrogen bonding may occur between the polymers. When this occurs, the affinity of the amylose molecules for water is reduced. This phenomenon is commonly referred to as

retrogration.

In the method as exemplified in Example 1, the initial rehydration and forming steps produce a strong, stable sheet of material wherein retrogration of the amylose molecules significantly reduces the surface's affinity for bonding.

Subsequent layering of one sheet on another produces only a relatively weak bond between the surfaces, allowing the layers to be forced apart by steam, generated during the cooking process.

Cutting of the layered material destroys the laminations in the vicinity of the cut and welds the layers together at the edge of the food article. This assists in trapping steam between the layers during cooking.

THE CLAIMS

1. A method of producing a hollow food article comprising contiguously positioning at least two layers of starch-containing material to form a layered material wherein each of said layers has a limited affinity for the adjacent layer(s), shaping said layered material to form an uncooked food article, causing sealing of the interface between the adjacent layers at the extremities of the food article and cooking said food article in a manner such that steam generated within the food article during cooking forces adjacent layers apart at a point remote from the extremities of the food article while retaining contact between adjacent layers at the extremities of the food article.
2. A method according to claim 1 wherein said starch-containing material comprises a mixture of vegetable or cereal granules, flakes or starches and, optionally emulsifiers and other additives customary in food processing.
3. A method according to claim 2 wherein said starch-containing material comprises a mixture of potato granules, flakes or starches.
4. A method according to claims 1, 2 or 3 wherein said starch-containing material has undergone at least partial retrogradation prior to being formed into said layered material.
5. A method of producing a hollow food article comprising rolling or extruding a material comprising starch-containing vegetable or cereal solids to form at least one layer of said material, contiguously positioning at least two layers to form a layered material wherein each of said layers is separable from the adjacent layer(s), cutting said layered

material to form an uncooked food article and cooking the food article in a manner such that steam generated within the food article during cooking forces adjacent layers apart at a point remote from the extremities of the food article while retaining contact between adjacent layers at the extremities of the food article.

6. A method according to claim 5 wherein said material comprising vegetable or cereal solids is extruded to form a tube which is then passed through at least one set of rollers to form said layered material.

7. A method according to claim 5 wherein said food article is cooked by frying in cooking oil at a temperature of 160°C to 200°C for 10 to 300 seconds.

8. A method as herein described with reference to the Example.

9. A hollow food article manufactured by a method according to any of claims 1 to 8.



# INTERNATIONAL SEARCH REPORT

International Application No PCT/AU 88/00064

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (if several classification symbols apply, indicate all) <sup>8</sup> According to International Patent Classification (IPC) or to both National Classification and IPC <div style="text-align: center; font-size: 1.2em;">Int. Cl. <sup>4</sup> A23L 1/18, 1/164, 1/216, 1/217, A23P 1/14</div>		
<b>II. FIELDS SEARCHED</b> <div style="display: flex; justify-content: space-between;"> <span>Classification System</span> <span>Minimum Documentation Searched <sup>7</sup></span> </div> <div style="display: flex; justify-content: space-between;"> <span>IPC</span> <span>Classification Symbols</span> </div> <div style="text-align: center; font-size: 1.2em;">A23L 1/164, 1/216, 1/217</div>		
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched <sup>6</sup> <div style="text-align: center; font-size: 1.2em;">AU : IPC as above 34.331, 34.792</div>		
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT <sup>9</sup></b>		
Category <sup>10</sup>	Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>
A A A A A A A A A	US,A, 4381906 (MANCINI) 3 May 1983 (03.05.83) US,A, 4382768 (LIFSHITZ et al) 10 May 1983 (10.05.83) US,A, 4303690 (HAAS, Sr et al) 1 December 1981 (01.12.81) US,A, 4044166 (KOIZUMI) 23 August 1977 (23.08.77) US,A, 3925567 (ABE) 9 December 1975 (09.12.75) GB,A, 2018562 (JEAN-MARIE BULTHEEL) 24 October 1979 (24.10.79) AU,B, 44774/85 (572315) (MILCHHOF-EISKREM GmbH AND CO. KG) 13 February 1986 (13.02.86) AU,A, 48212/85 (KABUSHIKI KAISHA AIRIN) 24 April 1986 (24.04.86)	
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p><sup>14</sup> Special categories of cited documents: <sup>15</sup></p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"A" document member of the same patent family</p> </div> </div>		
<b>IV. CERTIFICATION</b>		
Date of the Actual Completion of the International Search <div style="text-align: center; font-size: 1.2em;">16 June 1988 (16.06.88)</div>	Date of Mailing of this International Search Report <div style="text-align: center; font-size: 1.2em;">(27.06.88) 27 JUNE 1988</div>	
International Searching Authority <div style="text-align: center; font-size: 1.2em;">Australian Patent Office</div>	Signature of Authorized Officer <div style="text-align: center; font-size: 1.2em;">R. E. Grant (R.E. GRANT)</div>	

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON  
INTERNATIONAL APPLICATION NO. PCT/AU 88/00064

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report	Patent Family Members		
US 4303690	AR 214211 BE 859047 CH 622679 FR 2365960 NL 7710610	AT 7258/76 BR 7706344 DE 2735391 GB 1580860	AU 28980/77 CA 1080549 ES 462816 JP 53062885
US 4044166	JP 51144763	JP 52003669	
GB 2018562	BE 875019 ES 479483 IT 1111950	CH 637526 FR 2422336 NL 7902961	DE 2911622 GB 2018562
AU 44774/85	DE 8423709	EP 170700	JP 61047136
AU 48212/85	DE 3536249 JP 61096952	FR 2571592 US 4667588	GB 2165437

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